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Appendix A Exposure Assumptions

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EXPOSURE FACTORS

This appendix contains a detailed description of the exposure factors used in the risk assessment. In general, Oregon Department of Environmental Quality (ODEQ 2000) defaults were used in the evaluation of the on-site worker where available; and the U.S. Environmental Protection Agency's (EPA) Soil Screening Guidance (USEPA 2001a) defaults were used in the evaluation of the construction worker. The exposure factors used for each population are discussed below.

General Exposure Factors

The following exposure factors are common to both the scenarios evaluated in this risk assessment.

Body Weight. An adult body weight of 70 kilograms (kg) was assumed as recommended in ODEQ (2000). This is the average body weight for adult men and women combined, rounded to 70 kg (USEPA 1991a, 1991b). Average body weights were used for both the reasonable maximum exposure (RME) and central tendency (CT) cases, because when combined with the other variables in the intake equation, it is believed to result in the most reasonable estimate of intake (USEPA 1989). For example, it would not be reasonable to assume that the smallest person would have the highest intake.

Averaging Time. For both the RME and CT scenarios, an averaging time of 70 years (equivalent to a lifetime) was used (ODEQ 2000 and USEPA 1989) when evaluating carcinogens. For noncarcinogens, an averaging time equal to the exposure duration was used (ODEQ 2000 and USEPA 1989).

Exposure Time. A worker is assumed to spend 8 hours a day at work under both the RME and CT exposure scenarios.

Exposure Frequency. The default RME occupational exposure frequency of 250 days per year was used (ODEQ 2000 and USEPA 1991a). This is based on a 5-day workweek with 2 weeks of vacation a year. For CT, 219 days per year was used. This is based on the U.S. average of full-time and part-time employees (USEPA 1993).

Skin Surface Area. An exposed skin surface area for on-site workers and construction workers was assumed to be 3,300 cm² for both the RME and CT as recommended in the Soil Screening Guidance Amendment (USEPA 2001a); this corresponds to exposure to head, forearms, and hands.

Dermal Absorption Factor. The dermal absorption factor represents the fraction of a chemical that is absorbed through the skin via contact with soil. EPA recommends evaluating the dermal pathway for soil exposure for chemicals for which dermal data are available (USEPA 2001b). Therefore, arsenic and the PAHs were evaluated for the dermal pathway using the following dermal absorption factors: 0.03 and 0.13, respectively (USEPA 2001b).

Particulate Emission Factor. The particulate emission factor (PEF) relates the concentration of contaminant in soil with the concentration of dust particles in the air, or "fugitive dust" (USEPA 1996). Inorganic compounds such as metals and semi-volatile organic compounds can adhere to soil particles. Wind erosion of soil particles could then generate dust-containing COPCs into the air. These fugitive dust emissions are transported to human receptors by wind advection and turbulence-driven dispersion. Exposure may then occur via inhalation of airborne dust.

Appendix A Exposure Assumptions

Potential exposure to airborne dust within the facility is estimated using a PEF that relates the concentration of soil contaminant to the concentration of dust particles in the air. The PEF equation based on wind erosion used in the construction worker scenario and the on-site worker scenario is shown on Table A-1.

The emissions part of the equation is based on the “unlimited reservoir” model from Cowherd et al. (1985) developed to estimate particulate emissions due to wind erosion (USEPA 1996). The dispersion part of the equation includes a dispersion coefficient (Q/C_{wind}). The variable, Q/C_{wind} , was derived from a modeling exercise using meteorological data from 29 locations across the United States (USEPA 1996). Therefore, site-specific dispersion factors can be calculated that reflect the site location and climate as well as the site size. The look-up table in Exhibit D-2 of the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites: Peer Review Draft* (USEPA 2001a) provides the three constants for the Q/C_{wind} equation for each of the 29 cities. Using the constants provided for Salem, Oregon, the city with meteorological conditions most similar to Linnton, a PEF was calculated to be $1.06E+09 \text{ m}^3/\text{kg}$. Table A-1 summarizes the inputs for the PEF equation.

The Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites: Peer Review Draft (USEPA 2001a) also provides a more complicated method for deriving a PEF for a construction scenario, which takes into account the amount of dust thrown into the air from vehicle traffic. At present, no construction scenarios are planned at the site. Therefore, the detailed site-specific information required for input into this PEF equation was not available (i.e., length and width of construction roads, number and average weight of construction vehicles, etc). Therefore, the simpler approach for estimating PEF using the equation above was used instead. If construction activities are planned in the future, particulate air concentrations could be recalculated using project-specific information.

Volatilization Factor. The soil-to-air volatilization factor (VF) is used to define the relationship between the concentration of the contaminant in soil and the flux of the volatilized contaminant to air. The *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites: Peer Review Draft* (USEPA 2001a) provides a method for deriving chemical specific VFs that are appropriate for evaluating exposures for subchronic outdoor inhalation of volatiles by construction workers. The equation used to derive the VFs for the construction worker scenario is Equation 5-14 of the Supplemental Guidance and is shown in Table A-1. The VF equation combines chemical-specific properties with dispersion assumptions. The default subchronic dispersion factor for volatiles factor, Q/C_{sa} , was derived using EPA’s SCREEN3 dispersion model for a hypothetical site under a wide range of meteorological conditions. Unlike the Q/C value for the PEF above, the Q/C_{sa} can only be modified to reflect different site sizes; it cannot be modified for climatic zone. The default Q/C_{sa} was used which conservatively assumes a 0.5-acre site. The time interval, T, is the total time over which construction occurs in seconds. For the construction worker scenario, a time interval of 3.2×10^7 seconds (1 year x 365 days/year x 24 hours/day x 60 min/hour x 60 sec/min) was assumed, which is equal to the assumed exposure duration for the construction worker.

For the on-site worker scenario, Equation B-11 of the Supplemental Guidance was used to derive the chemical-specific VFs. This is the same equation used to derive volatilization factors for residential exposures. The variable, Q/C_{vol} , was derived by mean of a modeling exercise using meteorological data from 29 locations across the United States (USEPA 1996), and allows a risk

Appendix A **Exposure Assumptions**

assessor to calculate a site-specific VF. Table A-1 summarizes the variables used in the VF equation.

On-site Worker.

The following exposure factors apply specifically to the on-site workers.

Ingestion Rate. The ODEQ defaults for occupational soil ingestion rates of 100 mg/day and 50 mg/day, for the RME and CT respectively were used. The RME ingestion rate of 100 mg/day is an ODEQ proposed value, and the CT ingestion rate of 50 mg/day is EPA's default adult residential soil ingestion rate. This value is based on the soil ingestion rate for adults who do not engage in activities with a lot of soil or dust contact on a regular basis (USEPA 1997).

Exposure Duration. For the RME, a worker was conservatively assumed to work for 25 years in the same area (ODEQ 2000); this represents the 95th percentile for length of time that employees work in the same location, according to the Bureau of Labor Statistics (as cited in USEPA 1991a). For CT, the average time a worker is assumed to work at one job of 6 years was used (USEPA 1997).

Inhalation Rate. An inhalation rate of 1.3 m³/hour was conservatively assumed for both the RME and CT scenarios for an on-site worker. This value is the hourly average inhalation rate for an outdoor worker as reported in the Exposures Factors Handbook (USEPA 1997). This value was conservatively assumed because workers at the Linnton Facility spend a significant portion of their time sedentary while indoors, thus reducing their inhalation rate.

Adherence Factor. A soil to skin adherence factor of 0.2 mg/cm²-event was assumed for the on-site worker as recommended for RME industrial worker exposures to soil in the Soil Screening Guidance Amendment (USEPA 2001a). This value (as cited in USEPA 2001a) represents the median values for all adult workers at commercial and industrial sites based on EPA studies (USEPA 1997). For the CT scenario, a value of 0.02 mg/cm²-event was assumed for the on-site worker per ODEQ direction (KHM 2002).

Construction Worker

The following exposure factors apply specifically to construction workers.

Exposure Duration. The recommended construction worker exposure duration of 1 year was selected (USEPA 2001a) for both the RME and CT exposure scenarios.

Ingestion Rate. An RME soil ingestion rate of 330 mg/day for a construction worker was selected as recommended in the Amended Soil Screening Guidance (USEPA 2001a). This value is the upper percentile adult ingestion rate from a soil ingestion mass-balance study conducted by Stanek et al. (1997) of adults engaged in routine day-to-day activities over a 4-week period. However, this estimate, as stated by the authors, is highly uncertain due to the small size of the study. For the CT case, the ODEQ default CT soil ingestion rate of 100 mg/day was used (ODEQ (2000)).

Inhalation Rate. For the RME and CT, the recommended construction worker inhalation rate of 20 m³/day was selected (USEPA 2001a). According to the Exposure Factors Handbook (USEPA 1997), an inhalation rate for adults engaged in light activities is 1 m³/hour, 1.6 m³/hour for those engaged in moderate activities, and a rate 2.5 m³/hour for those engaged in heavy activities

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outdoors. In an occupational scenario, this value of 20 m³/day equates to an inhalation rate of 2.5 m³/hour for 8 hours/day, which is likely an overestimate.

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Table A-1
Summary of Volatilization Factor and Particulate Emission Factor Inputs and Equations
Kinder Morgan Liquid Terminals, LLC
Linniton Facility

Parameter	Definition (units)	Value	Source
$D_A = \{[(q_a^{10/3} \times D_l \times H^3) + (q_w^{10/3} \times D_w)]/n^2\} / (p_b k_{oc} f_{oc} + q_w + q_a H^3)$			
q_a	Air-filled soil porosity (L_{air}/L_{soil})	0.28	Default value (USEPA 2001a)
D_l	Diffusivity in air (cm^2/s)	Chemical specific	Table 37 page 137 of USEPA 1996
H^3	Henry's Law constant (unitless)	Chemical specific	Table 36 page 134 of USEPA 1996
q_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15	Default value (USEPA 2001a)
D_w	Diffusivity in water (cm^2/s)	Chemical specific	Table 37 page 137 of USEPA 1996
n	Total soil porosity (L_{pore}/L_{soil})	0.43	$1 - (p_b/p_s)$
p_b	Dry soil bulk density (g/cm^3)	1.5	Default value (USEPA 2001a)
p_s	Soil particle density (g/cm^3)	2.65	Default value (USEPA 2001a)
k_{oc}	Soil organic carbon-water partition coefficient (cm^3/g)	Chemical specific	Table 39 page 143 of USEPA 1996. The larger of the calculated K_{oc} or measured K_{oc} was used.
f_{oc}	Organic carbon content (g/g)	0.006	Default value (USEPA 2001a)
$VF = Q/C \times (1/F_D) \times [(3.14 \times D_A \times T)^{1/2} / (2 \times p_b \times D_A)] \times 10^{-4}$ * The F_D factor is only used with the Q/C_{sa} dispersion coefficient			
Q/C_{vol} [Q/C_{sa}]	Dispersion coefficient for volatiles [subchronic dispersion coefficient] ($\text{g}/\text{m}^2\text{-s per kg}/\text{m}^3$)	72.8 [14.35]	Area specific. Assumed that Salem, OR had the most similar meteorological conditions and assumed conservatively a 0.5-acre site. Exhibit D-3 of USEPA 2001a. (Default value [USEPA 2001a])
F_D	Dispersion correction factor (unitless) The F_D factor is only used with the Q/C_{sa} dispersion coefficient.	0.19	Default value (USEPA 2001a)
T (on-site worker)	Exposure interval (s)	9.5×10^8	Default value (USEPA 2001a)
T (construction worker)	Exposure interval (s)	$3.2E+07$	Total time over which construction occurs; site specific.
p_b	Dry soil bulk density (g/cm^3)	1.5	Default value (USEPA 2001a)
$PEF = [Q/C_{wind} \times 3600] / [0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)]$			
Q/C_{wind}	Dispersion coefficient for fugitive dust ($\text{g}/\text{m}^2\text{-s per kg}/\text{m}^3$)	72.80	Area specific. Assumed that Salem, OR had the most similar meteorological conditions and assumed conservatively a 0.5-acre site. Exhibit D-2 of USEPA 2001a.
V	Fraction of vegetative cover (unitless)	0.5	Default value (USEPA 2001a)
U_m	Mean annual windspeed (m/s)	4.69	Default value (USEPA 2001a)
U_t	Equivalent threshold value of windspeed at 7 m (m/s)	11.32	Default value (USEPA 2001a)
$F(x)$	Function dependent on U_m/U_t	0.194	Default value (USEPA 2001a)
PEF	Particulate emission factor (m^3/kg)	$1.06E+09$	NA

Appendix B

**Distribution Checks And Statistical Summaries Of Data Used To Calculate
Exposure Point Concentrations**

Appendix B
Distribution Checks And Statistical Summaries Of Data
Used To Calculate Exposure Point Concentrations

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PART B-1
SURFACE SOIL

Table B-1.1
Distribution Analysis and Statistical Summaries - Surface Soil
Benzene

Concentration (mg/kg)	Sample Location	MTCASat 2.1			
0.025	HA-2	Number of samples		Uncensored values	
0.025	HA-3	Uncensored	44	Mean	0.07
0.025	HO-3	Censored		Lognormal mean	0.04
0.00759	HO-4	Detection limit or PQL		Std. devn.	0.227275901
0.025	HO-5	Method detection limit		Median	0.025
0.025	MW-07	TOTAL	44	Min.	0.00759
0.05	MW-09			Max.	1.52
0.25	MW-10				
0.00912	MW-11				
0.0204	MW-12				
1.52	MW-13				
0.025	MW-14	Lognormal distribution?		Normal distribution?	
0.025	MW-15	r-squared is:		r-squared is:	
0.025	MW-16	Recommendations:			
0.025	SP-10	Reject lognormal distribution.			
0.025	SP-11	W value is 0.4839. This is less than the tabled value of 0.944			
0.025	SP-12	Reject normal distribution.			
0.025	SP-13	W value is 0.2051. This is less than the tabled value of 0.944			
0.025	SP-14				
0.025	SP-15				
0.025	SS-01				
0.025	SS-02	UCL (based on t-statistic) is 0.122691618168084			
0.025	SS-03				
0.025	SS-04				
0.025	SS-05				
0.025	SS-06				
0.025	SS-07				
0.025	SS-08				
0.025	SS-09				
0.0118	SS-10				
0.025	SS-11				
0.025	SS-12				
0.025	SS-13				
0.025	SS-14				
0.025	SS-15				
0.025	SS-16				
0.025	SS-17				
0.025	SS-18				
0.025	SS-19				
0.025	SS-20				
0.0937	SS-21				
0.025	SS-22				
0.025	SS-25				
0.025	SS-26				

Table B-1.2
Distribution Analysis and Statistical Summaries - Surface Soil
Naphthalene

Concentration (mg/kg)	Sample Location	MTCASStat 2.1			
0.135	HA-2				
0.025	HA-3				
0.0512	HO-3				
0.025	HO-4				
0.22	HO-5				
0.0005	MW-07				
1.7	MW-09				
3.35	MW-10				
0.1	MW-11				
0.152	MW-12				
3	MW-13				
0.025	MW-14	Number of samples	Uncensored values		
0.025	MW-15	Uncensored	44	Mean	0.45
3.3	MW-16	Censored		Lognormal mean	0.40
0.025	SP-10	Detection limit or PQL		Std. devn.	0.961100312
0.025	SP-11	Method detection limit		Median	0.0454
0.025	SP-12	TOTAL	44	Min.	0.0005
0.025	SP-13			Max.	3.35
0.0454	SS-01				
0.045	SS-02	Lognormal distribution?	Normal distribution?		
0.065	SS-03	r-squared is:	r-squared is:		
0.0454	SS-04	Recommendations:			
0.335	SS-05	Reject lognormal distribution.			
0.0521	SS-06	W value is 0.8681. This is less than the tabled value of 0.944			
0.0335	SS-07	Reject normal distribution.			
0.31	SS-08	W value is 0.4914. This is less than the tabled value of 0.944			
0.029	SS-09				
0.1	SS-10				
0.065	SS-11				
0.065	SS-12				
0.335	SS-13				
0.025	SS-14				
0.02	SS-15				
0.66	SS-16				
0.025	SS-17				
1.65	SS-18				
0.025	SS-19				
3.3	SS-20				
0.038	SS-21				
0.012	SS-22				
0.025	SS-25				
0.13	SS-26				
UCL (based on t-statistic) is 0.691307632708791					

Table B-1.3
Distribution Analysis and Statistical Summaries - Surface Soil
n-Propylbenzene

Concentration (mg/kg)	Sample Location
0.0782	MW-09
0.0754	MW-11
0.147	MW-12
10.1	MW-13

MTCASStat 2.1	
Number of samples	Uncensored values
Uncensored	4
Censored	Mean 2.60
Detection limit or PQL	Lognormal mean 4.86
Method detection limit	Std. devn. 5.00000964
TOTAL	Median 0.1126
	Min. 0.0754
	Max. 10.1
Lognormal distribution? r-squared is:	Normal distribution? r-squared is:
Recommendations: Reject lognormal distribution. W value is 0.7265. This is less than the tabled value of 0.748 Reject normal distribution. W value is 0.6349. This is less than the tabled value of 0.748	
UCL (based on t-statistic) is 8.48	

Table B-1.4
Distribution Analysis and Statistical Summaries - Surface Soil
Benzo(a)anthracene

Concentration (mg/kg)	Sample Location
0.14	HA-2
0.077	HA-3
0.00005	MW-07
3.2	MW-09
0.19	MW-10
0.0335	MW-11
0.335	MW-12
3.3	MW-13
0.56	MW-16
13.6	SS-01
0.34	SS-02
0.18	SS-03
0.16	SS-04
2.6	SS-05
0.061	SS-07
12	SS-08
0.16	SS-10
0.097	SS-11
0.62	SS-12
1.8	SS-13
0.037	SS-15
0.049	SS-16
0.14	SS-18
0.3	SS-20
0.082	SS-21
0.04	SS-22
15.3	SS-26

MTCASStat 2.1		Uncensored values			
Number of samples		Mean	2.05		
Uncensored	27	Lognormal mean	6.14		
Censored		Std. devn.	4.30432719		
Detection limit or PQL		Median	0.18		
Method detection limit		Min.	0.00005		
TOTAL	27	Max.	15.3		
Lognormal distribution?		Normal distribution?			
r-squared is:		r-squared is:			
Recommendations:					
Reject lognormal distribution.					
W value is 0.88. This is less than the tabled value of 0.923					
Reject normal distribution.					
W value is 0.5211. This is less than the tabled value of 0.923					
UCL (based on t-statistic) is 3.46510533033546					

Table B-1.5
Distribution Analysis and Statistical Summaries - Surface Soil
Benzo(a)pyrene

Concentration (mg/kg)	Sample Location
0.067	HA-2
0.065	HA-3
0.00005	MW-07
2.6	MW-09
0.22	MW-10
0.072	MW-11
0.335	MW-12
1.7	MW-13
3.3	MW-16
14.4	SS-01
0.3	SS-02
0.28	SS-03
0.18	SS-04
2.6	SS-05
0.14	SS-07
11	SS-08
0.2	SS-10
0.24	SS-11
0.91	SS-12
1.8	SS-13
0.039	SS-15
0.1	SS-16
0.25	SS-18
1	SS-20
0.096	SS-21
0.037	SS-22
14.8	SS-26

MTCASStat 2.1			
Number of samples		Uncensored values	
Uncensored	27	Mean	2.10
Censored		Lognormal mean	7.23
Detection limit or PQL		Std. devn.	4.21145317
Method detection limit		Median	0.25
TOTAL	27	Min.	0.00005
		Max.	14.8
Lognormal distribution?		Normal distribution?	
r-squared is:		r-squared is:	
Recommendations:			
Reject lognormal distribution.			
W value is 0.8719. This is less than the tabled value of 0.923			
Reject normal distribution.			
W value is 0.5331. This is less than the tabled value of 0.923			
UCL (based on t-statistic) is 3.48385368664535			

Table B-1.6
Distribution Analysis and Statistical Summaries - Surface Soil
Benzo(b)fluoranthene

Concentration (mg/kg)	Sample Location	MTCASStat 2.1			
0.036	HA-2	Number of samples		Uncensored values	
0.073	HA-3	Uncensored	27	Mean	2.18
0.00005	MW-07	Censored		Lognormal mean	6.79
1.5	MW-09	Detection limit or PQL		Std. devn.	4.48568611
0.14	MW-10	Method detection limit		Median	0.335
0.17	MW-11	TOTAL	27	Min.	0.00005
0.335	MW-12			Max.	16
3.3	MW-13				
0.47	MW-16				
16	SS-01				
0.78	SS-02	Lognormal distribution?		Normal distribution?	
0.35	SS-03	r-squared is:		r-squared is:	
0.17	SS-04				
2.5	SS-05	Recommendations:			
0.15	SS-07	Reject lognormal distribution.			
12	SS-08	W value is 0.8328. This is less than the tabled value of 0.923			
0.33	SS-10	Reject normal distribution.			
0.23	SS-11	W value is 0.5117. This is less than the tabled value of 0.923			
0.84	SS-12				
2.6	SS-13				
0.11	SS-15				
0.33	SS-16	UCL (based on t-statistic) is 3.64881572972263			
0.53	SS-18				
0.6	SS-20				
0.18	SS-21				
0.13	SS-22				
14.9	SS-26				

Table B-1.7
Distribution Analysis and Statistical Summaries - Surface Soil
Dibenz(a,h)anthracene

Concentration (mg/kg)	Sample Location
0.01	HA-2
0.011	HA-3
0.00005	MW-07
0.38	MW-09
0.065	MW-10
0.03	MW-11
0.335	MW-12
3.3	MW-13
0.38	MW-16
4.55	SS-01
0.1	SS-02
0.091	SS-03
0.057	SS-04
0.62	SS-05
0.05	SS-07
3.1	SS-08
0.079	SS-10
0.1	SS-11
0.3	SS-12
0.82	SS-13
0.017	SS-15
0.077	SS-16
0.1	SS-18
0.39	SS-20
0.035	SS-21
0.014	SS-22
4.56	SS-26

MTCAS stat 2.1							
Number of samples		Uncensored values					
Uncensored	27	Mean	0.72				
Censored		Lognormal mean	1.99				
Detection limit or PQL		Std. devn.					
Method detection limit		Median	0.1				
TOTAL		Min.	0.00005				
		Max.	4.56				
Lognormal distribution?		Normal distribution?					
r-squared is:		r-squared is:					
Recommendations:							
Reject lognormal distribution.							
W value is 0.9098. This is less than the tabled value of 0.923							
Reject normal distribution.							
W value is 0.5547. This is less than the tabled value of 0.923							
UCL (based on t-statistic) is 1.17820373905564							

Table B-1.8
Distribution Analysis and Statistical Summaries - Surface Soil
Indeno(1,2,3-cd)pyrene

Concentration (mg/kg)	Sample Location	MTCASat 2.1			
0.011	HA-2	Number of samples		Uncensored values	
0.035	HA-3	Uncensored	27	Mean	1.65
0.00005	MW-07	Censored		Lognormal mean	5.66
0.99	MW-09	Detection limit or PQL		Std. devn.	3.32143391
0.15	MW-10	Method detection limit		Median	0.25
0.035	MW-11	TOTAL	27	Min.	0.00005
0.335	MW-12			Max.	11.5
3.3	MW-13				
0.75	MW-16				
11.5	SS-01	Lognormal distribution?		Normal distribution?	
0.26	SS-02	r-squared is:		r-squared is:	
0.19	SS-03	Recommendations:			
0.16	SS-04	Reject lognormal distribution.			
1.8	SS-05	W value is 0.8959. This is less than the tabled value of 0.923			
0.14	SS-07	Reject normal distribution.			
8.6	SS-08	W value is 0.5286. This is less than the tabled value of 0.923			
0.13	SS-10				
0.21	SS-11				
0.81	SS-12				
2	SS-13				
0.043	SS-15				
0.25	SS-16	UCL (based on t-statistic) is 2.73705010138297			
0.25	SS-18				
0.87	SS-20				
0.1	SS-21				
0.038	SS-22				
11.5	SS-26				

Table B-1.9
Distribution Analysis and Statistical Summaries - Surface Soil
Arsenic

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location
15.4	HA-2	3.09	SS-15
16.5	HA-3	6.15	SS-16
5	MW-05	3.77	SS-17
4.21	MW-07	9.79	SS-18
3.26	MW-08	3.91	SS-19
5.92	MW-09	3.12	SS-20
2.69	MW-10	4.02	SS-21
8.67	MW-11	3.63	SS-22
3.57	MW-12	2.86	SS-25
2.44	MW-13	6.52	SS-26
3.39	MW-14	3.21	SS-27
1.14	MW-15	1.77	SS-28
2.57	MW-16		
2.43	P-1		
1.88	P-2		
2.3	P-3		
6.63	P-4		
3.25	P-5		
8.08	SP-6		
6.07	SP-7		
2.42	SP-8		
5.85	SP-9		
6.76	SS-01		
3.02	SS-02		
2.13	SS-03		
2.71	SS-04		
6.93	SS-05		
1.22	SS-06		
3.1	SS-07		
80.7	SS-08		
3.15	SS-09		
3.13	SS-10		
2.84	SS-11		
1.99	SS-12		
11.7	SS-13		
10.2	SS-14		

MTCASStat 2.1		Uncensored values		
Number of samples		Mean	6.36	
Uncensored	48	Lognormal mean	5.52	
Censored		Std. devn.	11.4645653	
Detection limit or PQL		Median	3.325	
Method detection limit		Min.	1.14	
	TOTAL	48	Max.	80.7
Lognormal distribution?		Normal distribution?		
r-squared is:		r-squared is:		
Recommendations:				
Reject lognormal distribution.				
W value is 0.9074. This is less than the tabled value of 0.947				
Reject normal distribution.				
W value is 0.3579. This is less than the tabled value of 0.947				
UCL (based on t-statistic) is 9.14				

Table B-1.10
Distribution Analysis and Statistical Summaries - Surface Soil
Chromium

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location
32.6	HA-2	17.9	SS-15
28.4	HA-3	308	SS-16
16.4	MW-05	19	SS-17
15	MW-07	69.3	SS-18
14.6	MW-08	527	SS-19
23.3	MW-09	15.5	SS-20
22.6	MW-10	20.5	SS-21
23.8	MW-11	18.8	SS-22
15.5	MW-12	14.9	SS-25
13	MW-13	317	SS-26
16.4	MW-14	2360	SS-27
6.93	MW-15	11.9	SS-28
14.1	MW-16		
26.6	P-1		
15	P-2		
19	P-3		
19.2	P-4		
15.2	P-5		
24.3	SP-6		
20.5	SP-7		
8.95	SP-8		
133	SP-9		
136	SS-01		
51.6	SS-02		
1470	SS-03		
329	SS-04		
71.4	SS-05		
1750	SS-06		
2050	SS-07		
101	SS-08		
13.5	SS-09		
50.4	SS-10		
41.1	SS-11		
1530	SS-12		
137	SS-13		
30.5	SS-14		

MTCASstat 2.1					
Number of samples		Uncensored values			
Uncensored	48	Mean	249.70		
Censored		Lognormal mean	174.54		
Detection limit or PQL		Std. devn.	565.273484		
Method detection limit		Median	23.55		
TOTAL	48	Min.	6.93		
		Max.	2360		
Lognormal distribution?		Normal distribution?			
r-squared is:		r-squared is:			
Recommendations:					
Reject lognormal distribution.					
W value is 0.8083. This is less than the tabled value of 0.947					
Reject normal distribution.					
W value is 0.4778. This is less than the tabled value of 0.947					
UCL (based on t-statistic) is 386.73					

Table B-1.11
Distribution Analysis and Statistical Summaries - Surface Soil
Lead

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location
22.2	HA-2	464	SS-15
19.4	HA-3	3570	SS-16
56.3	MW-05	436	SS-17
28.9	MW-07	747	SS-18
14.7	MW-08	593	SS-19
26.9	MW-09	147	SS-20
13	MW-10	361	SS-21
18.9	MW-11	152	SS-22
39	MW-12	28.8	SS-25
31.5	MW-13	2150	SS-26
6.22	MW-14	15.1	SS-27
4.15	MW-15	14	SS-28
16.7	MW-16		
114	P-1		
47.5	P-2		
73.1	P-3		
48	P-4		
5	P-5		
198	SP-6		
69.6	SP-7		
40.2	SP-8		
1470	SP-9		
1260	SS-01		
1820	SS-02		
2190	SS-03		
58.8	SS-04		
1350	SS-05		
1460	SS-06		
1560	SS-07		
544	SS-08		
79.8	SS-09		
1140	SS-10		
498	SS-11		
1490	SS-12		
906	SS-13		
282	SS-14		

MTCASStat 2.1	
Number of samples	Uncensored values
Uncensored	48
Censored	Lognormal mean 837.14
Detection limit or PQL	Std. devn. 777.564202
Method detection limit	Median 96.9
TOTAL	Min. 4.15
	Max. 3570
Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:
Recommendations:	
Reject lognormal distribution.	
W value is 0.9294. This is less than the tabled value of 0.947	
Reject normal distribution.	
W value is 0.7211. This is less than the tabled value of 0.947	
UCL (based on t-statistic) is 723.48	

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PART B-2

SURFACE AND SUBSURFACE SOIL

Table B-2.1
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Benzene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCASStat 2.1			
0.1	HA-1	0.1	SP-11	Number of samples		Uncensored values	
0.05	HA-1	0.025	SP-12	Uncensored	91	Mean	0.42
0.025	HA-2	0.25	SP-12	Censored		Lognormal mean	0.10
0.05	HA-2	0.025	SP-13	Detection limit or PQL		Std. devn.	2.82823187
0.025	HA-3	0.025	SP-14	Method detection limit		Median	0.025
0.5	HA-3	0.25	SP-14	TOTAL	91	Min.	0.00759
0.25	HO-1	0.025	SP-15			Max.	26.9
2.5	HO-2	0.025	SP-15				
0.025	HO-3	0.025	SP-5				
0.00759	HO-4	0.025	SP-6				
0.025	HO-5	0.025	SP-7				
0.0132	HO-5	0.025	SP-8	Lognormal distribution?		Normal distribution?	
0.025	MW-05	0.025	SP-8	r-squared is:		r-squared is:	
0.025	MW-06	0.025	SP-9	Recommendations:			
0.025	MW-07	0.025	SS-01	Reject lognormal distribution.			
0.05	MW-09	0.025	SS-02	Y value is -23.0016. This lies outside the tabled values of 1.2715 and -2.5772			
0.025	MW-09	0.025	SS-03	Reject normal distribution.			
0.25	MW-10	0.025	SS-04	Y value is -68.1829. This lies outside the tabled values of 1.2715 and -2.5772			
0.5	MW-10	0.025	SS-05				
0.021	MW-10	0.025	SS-06				
0.00912	MW-11	0.025	SS-07				
0.0204	MW-12	0.025	SS-08				
0.25	MW-12	0.025	SS-09				
0.32	MW-12	0.0118	SS-10				
1.52	MW-13	0.025	SS-11				
0.12	MW-13	0.025	SS-12				
0.025	MW-14	0.025	SS-13				
0.025	MW-14	0.025	SS-14				
0.05	MW-14	0.025	SS-15				
0.025	MW-15	0.025	SS-16				
0.05	MW-15	0.025	SS-17				
0.025	MW-16	0.025	SS-18				
0.025	MW-16	0.025	SS-19				
0.076	MW-16	0.025	SS-20				
0.025	P-2	0.0937	SS-21				
0.025	P-2	0.025	SS-22				
0.025	P-3	0.025	SS-25				
26.9	P-4	0.025	SS-26				
0.025	P-5	0.025	HO-3				
0.025	RF-1	0.025	HO-4				
0.5	RF-1	0.025	MW-07				
0.25	RF-2	0.025	SP-15				
0.0474	RF-3	0.025	SP-3				
1.55	RF-5						
0.025	SP-1						
0.025	SP-10						
0.025	SP-10						
0.025	SP-11						

Table B-2.2
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Naphthalene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCASStat 2.1			
0.335	HA-1	0.025	SP-11	Number of samples	Uncensored values		
0.13	HA-1	0.1	SP-11	Uncensored	92	Mean	2.81
0.135	HA-2	0.025	SP-12	Censored		Lognormal mean	3.56
0.165	HA-2	4.73	SP-12	Detection limit or PQL		Std. devn.	17.320261
0.025	HA-3	0.025	SP-13	Method detection limit		Median	0.0521
1	HA-3	0.025	SP-14	TOTAL	92	Min.	0.0005
10.5	HO-1	0.25	SP-14			Max.	164
164	HO-2	0.025	SP-15				
0.0512	HO-3	0.025	SP-15				
0.025	HO-4	0.0005	SP-2				
0.22	HO-5	0.076	SP-5				
0.0574	HO-5	0.0005	SP-6	Lognormal distribution?	Normal distribution?		
0.0005	MW-05	0.032	SP-7	t-squared is:	r-squared is:		
0.0005	MW-06	0.0005	SP-8	Recommendations:			
0.0005	MW-07	0.0005	SP-8	Reject lognormal distribution.			
1.7	MW-09	0.038	SP-9	Y value is -2.9987. This lies outside the tabled values of 1.2785 and -2.5716			
0.025	MW-09	0.0454	SS-01	Reject normal distribution.			
3.35	MW-10	0.045	SS-02	Y value is -66.1886. This lies outside the tabled values of 1.2785 and -2.5716			
3.35	MW-10	0.065	SS-03				
6.5	MW-10	0.0454	SS-04				
0.1	MW-11	0.335	SS-05				
0.152	MW-12	0.0521	SS-06	UCL (based on t-statistic) is 5.79469125222521			
3.35	MW-12	0.0335	SS-07				
3.35	MW-12	0.31	SS-08				
3	MW-13	0.029	SS-09				
0.335	MW-13	0.1	SS-10				
0.025	MW-14	0.065	SS-11				
0.165	MW-14	0.065	SS-12				
0.1	MW-14	0.335	SS-13				
0.025	MW-15	0.025	SS-14				
0.0627	MW-15	0.02	SS-15				
3.3	MW-16	0.66	SS-16				
0.025	MW-16	0.025	SS-17				
1.7	MW-16	1.65	SS-18				
0.0005	P-2	0.025	SS-19				
0.0005	P-2	3.3	SS-20				
0.0005	P-3	0.038	SS-21				
34	P-4	0.012	SS-22				
0.0005	P-5	0.025	SS-25				
0.025	RF-1	0.13	SS-26				
3.35	RF-1	0.0555	HO-3				
0.65	RF-2	0.025	HO-4				
0.1	RF-3	0.0005	MW-07				
2.5	RF-5	0.025	SP-15				
0.0005	SP-1	0.0005	SP-3				
0.025	SP-10						
0.025	SP-10						

Table B-2.3
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
n-Propylbenzene

Concentration (mg/kg)	Sample Location	MTCAStat 2.1			
0.158	HA-1	Number of samples		Uncensored values	
0.0421	HA-2	Uncensored	13	Mean	4.84
5.96	HA-3	Censored		Lognormal mean	15.32
0.0782	MW-09	Detection limit or PQL		Std. devn.	5.80615052
7.45	MW-10	Method detection limit		Median	0.158
14.3	MW-10	TOTAL	13	Min.	0.0421
0.0754	MW-11			Max.	14.9
0.147	MW-12				
14.9	MW-12				
10.1	MW-13				
0.131	MW-14	Lognormal distribution?		Normal distribution?	
0.143	MW-15	r-squared is:		r-squared is:	
9.48	MW-16				
		Recommendations:			
		Reject lognormal distribution.			
		W value is 0.7903. This is less than the tabled value of 0.866			
		Reject normal distribution.			
		W value is 0.7851. This is less than the tabled value of 0.866			
		UCL (based on t-statistic) is 7.7130579547449			

Table B-2.4
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Benzo(a)anthracene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCAStat 2.1			
0.1	HA-1	0.061	SS-07	Number of samples		Uncensored values	
0.825	HA-1	12	SS-08	Uncensored	62	Mean	1.00
0.14	HA-2	0.16	SS-10	Censored		Lognormal mean	28.21
0.165	HA-2	0.097	SS-11	Detection limit or PQL		Std. devn.	2.971367
0.077	HA-3	0.62	SS-12	Method detection limit		Median	0.125
0.165	HA-3	1.8	SS-13	TOTAL	62	Min.	0.00005
0.0335	HO-1	0.037	SS-15			Max.	15.3
0.03	HO-2	0.049	SS-16				
0.00005	MW-05	0.14	SS-18				
0.00005	MW-06	0.3	SS-20				
0.00005	MW-07	0.082	SS-21	Lognormal distribution?		Normal distribution?	
3.2	MW-09	0.04	SS-22	r-squared is:		r-squared is:	
0.19	MW-10	15.3	SS-26	Recommendations:			
0.34	MW-10	0.00005	MW-07	Reject lognormal distribution.			
0.38	MW-10	0.044	SP-3	Y value is -6.9377. This lies outside the tabled values of 1.1272 and -2.6896			
0.0335	MW-11			Reject normal distribution.			
0.335	MW-12			Y value is -36.1457. This lies outside the tabled values of 1.1272 and -2.6896			
0.17	MW-12						
0.064	MW-12						
3.3	MW-13						
0.061	MW-13						
0.165	MW-14						
0.165	MW-15						
0.56	MW-16						
1.8	MW-16						
0.00005	P-2						
0.045	P-2						
0.11	P-3						
0.075	P-4						
0.00005	P-5						
0.47	RF-1						
0.31	RF-2						
0.7	RF-3						
0.00005	SP-1						
0.067	SP-10						
0.14	SP-2						
0.1	SP-5						
0.00005	SP-6						
0.00005	SP-7						
0.086	SP-8						
0.00005	SP-8						
0.00005	SP-9						
13.6	SS-01						
0.34	SS-02						
0.18	SS-03						
0.16	SS-04						
2.6	SS-05						

Table B-2.5
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Benzo(a)pyrene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location
0.06	HA-1	11	SS-08
0.825	HA-1	0.2	SS-10
0.067	HA-2	0.24	SS-11
0.165	HA-2	0.91	SS-12
0.065	HA-3	1.8	SS-13
0.165	HA-3	0.039	SS-15
0.0335	HO-1	0.1	SS-16
0.0335	HO-2	0.25	SS-18
0.00005	MW-05	1	SS-20
0.00005	MW-06	0.096	SS-21
0.00005	MW-07	0.037	SS-22
2.6	MW-09	14.8	SS-26
0.22	MW-10	0.00005	MW-07
0.35	MW-10	0.014	SP-3
0.39	MW-10		
0.072	MW-11		
0.335	MW-12		
0.12	MW-12		
1.65	MW-12		
1.7	MW-13		
0.03	MW-13		
0.165	MW-14		
0.165	MW-15		
3.3	MW-16		
1.3	MW-16		
0.26	P-2		
0.041	P-2		
0.09	P-3		
0.00005	P-4		
0.00005	P-5		
0.33	RF-1		
0.31	RF-2		
0.96	RF-3		
0.00005	SP-1		
0.079	SP-10		
0.097	SP-2		
0.26	SP-5		
0.00005	SP-6		
0.00005	SP-7		
0.00005	SP-8		
0.00005	SP-8		
0.00005	SP-9		
14.4	SS-01		
0.3	SS-02		
0.28	SS-03		
0.18	SS-04		
2.6	SS-05		
0.14	SS-07		

MTCASStat 2.1					
Number of samples		Uncensored values			
Uncensored	62	Mean	1.04		
Censored		Lognormal mean	55.44		
Detection limit or PQL		Std. devn.	2.91904465		
Method detection limit		Median	0.165		
TOTAL	62	Min.	0.00005		
		Max.	14.8		
Lognormal distribution?		Normal distribution?			
r-squared is:		r-squared is:			
Recommendations:					
Reject lognormal distribution.					
Y value is -5.6739. This lies outside the tabled values of 1.1272 and -2.6896					
Reject normal distribution.					
Y value is -34.6948. This lies outside the tabled values of 1.1272 and -2.6896					
UCL (based on t-statistic) is 1.66172345266983					

Table B-2.6
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Benzo(b)fluoranthene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCAStat 2.1			
0.062	HA-1	12	SS-08	Number of samples		Uncensored values	
0.825	HA-1	0.33	SS-10	Uncensored	62	Mean	1.07
0.036	HA-2	0.23	SS-11	Censored		Lognormal mean	121.77
0.165	HA-2	0.84	SS-12	Detection limit or PQL		Std. devn.	3.10919792
0.073	HA-3	2.6	SS-13	Method detection limit		Median	0.165
0.165	HA-3	0.11	SS-15	TOTAL	62	Min.	0.00005
0.0335	HO-1	0.33	SS-16			Max.	16
0.0335	HO-2	0.53	SS-18				
0.00005	MW-05	0.6	SS-20				
0.00005	MW-06	0.18	SS-21				
0.00005	MW-07	0.13	SS-22				
1.5	MW-09	14.9	SS-26	Lognormal distribution?		Normal distribution?	
0.14	MW-10	0.00005	MW-07	r-squared is:		r-squared is:	
0.24	MW-10	0.00005	SP-3	Recommendations:			
0.24	MW-10			Reject lognormal distribution.			
0.17	MW-11			Y value is -5.0533. This lies outside the tabled values of 1.1272 and -2.6896			
0.335	MW-12			Reject normal distribution.			
0.079	MW-12			Y value is -35.6492. This lies outside the tabled values of 1.1272 and -2.6896			
1.65	MW-12						
3.3	MW-13						
0.023	MW-13						
0.165	MW-14						
0.165	MW-15						
0.47	MW-16						
0.53	MW-16						
0.12	P-2						
0.00005	P-2						
0.045	P-3						
0.00005	P-4						
0.00005	P-5						
0.36	RF-1						
0.19	RF-2						
2.4	RF-3						
0.00005	SP-1						
0.065	SP-10						
0.00005	SP-2						
0.13	SP-5						
0.00005	SP-6						
0.00005	SP-7						
0.00005	SP-8						
0.00005	SP-8						
0.00005	SP-9						
16	SS-01						
0.78	SS-02						
0.35	SS-03						
0.17	SS-04						
2.5	SS-05						
0.15	SS-07						

Table B-2.7
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Dibenz(a,h)anthracene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location
0.0335	HA-1	3.1	SS-08
0.825	HA-1	0.079	SS-10
0.01	HA-2	0.1	SS-11
0.165	HA-2	0.3	SS-12
0.011	HA-3	0.82	SS-13
0.165	HA-3	0.017	SS-15
0.0335	HO-1	0.077	SS-16
0.0335	HO-2	0.1	SS-18
0.00005	MW-05	0.39	SS-20
0.00005	MW-06	0.035	SS-21
0.00005	MW-07	0.014	SS-22
0.38	MW-09	4.56	SS-26
0.065	MW-10	0.00005	MW-07
0.048	MW-10	0.00005	SP-3
0.064	MW-10		
0.03	MW-11		
0.335	MW-12		
0.0335	MW-12		
1.65	MW-12		
3.3	MW-13		
0.0135	MW-13		
0.165	MW-14		
0.165	MW-15		
0.38	MW-16		
0.21	MW-16		
0.061	P-2		
0.00005	P-2		
0.00005	P-3		
0.00005	P-4		
0.00005	P-5		
0.335	RF-1		
0.135	RF-2		
0.33	RF-3		
0.00005	SP-1		
0.014	SP-10		
0.00005	SP-2		
0.00005	SP-5		
0.00005	SP-6		
0.00005	SP-7		
0.00005	SP-8		
0.00005	SP-8		
0.00005	SP-9		
4.55	SS-01		
0.1	SS-02		
0.091	SS-03		
0.057	SS-04		
0.62	SS-05		
0.05	SS-07		

MTCAS Stat 2.1			
Number of samples		Uncensored values	
Uncensored	62	Mean	0.41
Censored		Lognormal mean	24.01
Detection limit or PQL		Std. devn.	0.98215673
Method detection limit		Median	0.057
TOTAL	62	Min.	0.00005
		Max.	4.56
Lognormal distribution?		Normal distribution?	
r-squared is:		r-squared is:	
Recommendations:			
Reject lognormal distribution.			
Y value is -2.8675. This lies outside the tabled values of 1.1333 and -2.6849			
Reject normal distribution.			
Y value is -29.2214. This lies outside the tabled values of 1.1333 and -2.6849			
UCL (based on t-statistic) is 0.614674051844582			

Table B-2.8
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Indeno(1,2,3-cd)pyrene

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCASat 2.1		
0.0335	HA-1	8.6	SS-08	Number of samples	Uncensored values	
0.825	HA-1	0.13	SS-10	Uncensored	62	Mean 0.82
0.011	HA-2	0.21	SS-11	Censored		Lognormal mean 67.32
0.165	HA-2	0.81	SS-12	Detection limit or PQL		Std. devn. 2.30495471
0.035	HA-3	2	SS-13	Method detection limit		Median 0.155
0.165	HA-3	0.043	SS-15	TOTAL	62	Min. 0.00005
0.0335	HO-1	0.25	SS-16			Max. 11.5
0.0335	HO-2	0.25	SS-18			
0.00005	MW-05	0.87	SS-20			
0.00005	MW-06	0.1	SS-21			
0.00005	MW-07	0.038	SS-22			
0.99	MW-09	11.5	SS-26	Lognormal distribution?	Normal distribution?	
0.15	MW-10	0.00005	MW-07	r-squared is:	r-squared is:	
0.21	MW-10	0.00005	SP-3	Recommendations:		
0.24	MW-10			Reject lognormal distribution.		
0.035	MW-11			Y value is -4.1426. This lies outside the tabled values of 1.1272 and -2.6896		
0.335	MW-12			Reject normal distribution.		
0.042	MW-12			Y value is -34.651. This lies outside the tabled values of 1.1272 and -2.6896		
1.65	MW-12					
3.3	MW-13					
0.012	MW-13					
0.165	MW-14					
0.165	MW-15					
0.75	MW-16					
0.34	MW-16					
0.16	P-2					
0.00005	P-2					
0.04	P-3					
0.00005	P-4					
0.00005	P-5					
0.335	RF-1					
0.17	RF-2					
1.3	RF-3					
0.00005	SP-1					
0.058	SP-10					
0.00005	SP-2					
0.17	SP-5					
0.00005	SP-6					
0.00005	SP-7					
0.00005	SP-8					
0.00005	SP-8					
0.00005	SP-9					
11.5	SS-01					
0.26	SS-02					
0.19	SS-03					
0.16	SS-04					
1.8	SS-05					
0.14	SS-07					
				UCL (based on t-statistic) is 1.3079626382563		

Table B-2.9
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Arsenic

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location
12.4	HA-1	3.63	SS-22
12	HA-1	2.86	SS-25
15.4	HA-2	6.52	SS-26
13.3	HA-2	3.21	SS-27
16.5	HA-3	1.77	SS-28
10.4	HA-3		
5	MW-05		
22.5	MW-06		
4.21	MW-07		
3.26	MW-08		
5.92	MW-09		
2.69	MW-10		
8.67	MW-11		
3.57	MW-12		
2.44	MW-13		
3.39	MW-14		
1.14	MW-15		
2.57	MW-16		
2.43	P-1		
1.88	P-2		
2.3	P-3		
6.63	P-4		
3.25	P-5		
8.08	SP-6		
6.07	SP-7		
2.42	SP-8		
5.85	SP-9		
6.76	SS-01		
3.02	SS-02		
2.13	SS-03		
2.71	SS-04		
6.93	SS-05		
1.22	SS-06		
3.1	SS-07		
80.7	SS-08		
3.15	SS-09		
3.13	SS-10		
2.84	SS-11		
1.99	SS-12		
11.7	SS-13		
10.2	SS-14		
3.09	SS-15		
6.15	SS-16		
3.77	SS-17		
9.79	SS-18		
3.91	SS-19		
3.12	SS-20		
4.02	SS-21		

MTCASStat 2.1					
Number of samples			Uncensored values		
Uncensored	53	Mean	7.09		
Censored		Lognormal mean	6.40		
Detection limit or PQL		Std. devn.	11.2169634		
Method detection limit		Median	3.63		
TOTAL	53	Min.	1.14		
		Max.	80.7		
Lognormal distribution?		Normal distribution?			
r-squared is:		r-squared is:			
Recommendations:					
Reject lognormal distribution.					
Y value is -2.9721. This lies outside the tabled values of 1.0611 and -2.7396					
Reject normal distribution.					
Y value is -30.1161. This lies outside the tabled values of 1.0611 and -2.7396					
UCL (based on t-statistic) is 9.67					

Table B-2.10
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Chromium

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCASat 2.1			
30.7	HA-1	18.8	SS-22	Number of samples	Uncensored values		
28.2	HA-1	14.9	SS-25	Uncensored	53	Mean	228.79
32.6	HA-2	317	SS-26	Censored		Lognormal mean	148.50
28.6	HA-2	2360	SS-27	Detection limit or PQL		Std. devn.	541.37522
28.4	HA-3	11.9	SS-28	Method detection limit		Median	25.4
27.5	HA-3			TOTAL	53	Min.	6.93
16.4	MW-05					Max.	2360
25.4	MW-06						
15	MW-07						
14.6	MW-08						
23.3	MW-09						
22.6	MW-10			Lognormal distribution?	Normal distribution?		
23.8	MW-11			r-squared is:	r-squared is:		
15.5	MW-12				Recommendations:		
13	MW-13				Reject lognormal distribution.		
16.4	MW-14				Y value is -6.8674. This lies outside the tabled values of 1.0611 and -2.7396		
6.93	MW-15				Reject normal distribution.		
14.1	MW-16				Y value is -26.8289. This lies outside the tabled values of 1.0611 and -2.7396		
26.6	P-1				UCL (based on t-statistic) is 353.44		
15	P-2						
19	P-3						
19.2	P-4						
15.2	P-5						
24.3	SP-6						
20.5	SP-7						
8.95	SP-8						
133	SP-9						
136	SS-01						
51.6	SS-02						
1470	SS-03						
329	SS-04						
71.4	SS-05						
1750	SS-06						
2050	SS-07						
101	SS-08						
13.5	SS-09						
50.4	SS-10						
41.1	SS-11						
1530	SS-12						
137	SS-13						
30.5	SS-14						
17.9	SS-15						
308	SS-16						
19	SS-17						
69.3	SS-18						
527	SS-19						
15.5	SS-20						
20.5	SS-21						

Table B-2.11
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil
Lead

Concentration (mg/kg)	Sample Location	Concentration (mg/kg)	Sample Location	MTCASStat 2.1			
23.2	HA-1	152	SS-22	Number of samples		Uncensored values	
15.4	HA-1	28.8	SS-25	Uncensored	53	Mean	486.34
22.2	HA-2	2150	SS-26	Censored		Lognormal mean	692.74
15.7	HA-2	15.1	SS-27	Detection limit or PQL		Std. devn.	754.741707
19.4	HA-3	14	SS-28	Method detection limit		Median	69.6
13	HA-3			TOTAL	53	Min.	4.15
56.3	MW-05					Max.	3570
29.1	MW-06						
28.9	MW-07						
14.7	MW-08						
26.9	MW-09						
13	MW-10						
18.9	MW-11						
39	MW-12						
31.5	MW-13						
6.22	MW-14						
4.15	MW-15						
16.7	MW-16						
114	P-1						
47.5	P-2						
73.1	P-3						
48	P-4						
5	P-5						
198	SP-6						
69.6	SP-7						
40.2	SP-8						
1470	SP-9						
1260	SS-01						
1820	SS-02						
2190	SS-03						
58.8	SS-04						
1350	SS-05						
1460	SS-06						
1560	SS-07						
544	SS-08						
79.8	SS-09						
1140	SS-10						
498	SS-11						
1490	SS-12						
906	SS-13						
282	SS-14						
464	SS-15						
3570	SS-16						
436	SS-17						
747	SS-18						
593	SS-19						
147	SS-20						
361	SS-21						

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PART B-3

SURFACE AND SUBSURFACE SOIL (INDOOR AIR)

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Table B-3.1
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil to Indoor Air
Benzene

Concentration (mg/kg)	Sample Location	Number of samples				Uncensored values			
0.25	HO-1	Uncensored	10			Mean	0.29		
2.5	HO-2	Censored				Lognormal mean	0.18		
0.025	HO-3					Std. devn.	0.77821655		
0.00759	HO-4	Detection limit or PQL				Median	0.025		
0.025	HO-5	Method detection limit				Min.	0.00759		
0.0132	HO-5	TOTAL	10			Max.	2.5		
0.025	MW-06								
0.025	MW-14								
0.025	MW-14								
0.05	MW-14								
		Lognormal distribution?				Normal distribution?			
		r-squared is:				r-squared is:			
		Recommendations:							
		Reject lognormal distribution.							
		W value is 0.7746. This is less than the tabled value of 0.842							
		Reject normal distribution.							
		W value is 0.4204. This is less than the tabled value of 0.842							
		UCL (based on t-statistic) is 0.745668716907132							

Table B-3.2
Distribution Analysis and Statistical Summaries - Surface and Subsurface Soil to Indoor Air
Naphthalene

Concentration (mg/kg)	Sample Location	Number of samples				Uncensored values			
10.5	HO-1	Uncensored		10		Mean	17.51		
164	HO-2	Censored				Lognormal mean	61.71		
0.0512	HO-3					Std. devn.	51.5738922		
0.025	HO-4					Median	0.0787		
0.22	HO-5					Min.	0.0005		
0.0574	HO-5	TOTAL		10		Max.	164		
0.0005	MW-06								
0.025	MW-14								
0.165	MW-14								
0.1	MW-14								
		Lognormal distribution?				Normal distribution?			
		r-squared is:				r-squared is:			
		Recommendations:							
		Assume lognormal distribution.							
		W value is 0.9059. This exceeds the tabled value of 0.842							
		UCL (based on t-statistic) is 47.4089842821159							

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PART B-4

GROUNDWATER (OUTDOOR AIR)

Table B-4.1
Distribution Analysis and Statistical Summaries - Groundwater (Outdoor Air)
1,2-Dichloroethane

Concentration (ug/L)	Well Location	MTCAStat 2.1			
0.5	MW-01	Number of samples		Uncensored values	
0.5	MW-04	Uncensored	14	Mean	0.76
0.5	MW-05	Censored		Lognormal mean	0.73
0.61	MW-06	Detection limit or PQL		Std. devn.	0.742998085
0.5	MW-07	Method detection limit		Median	0.5
0.25	MW-08	TOTAL	14	Min.	0.25
2.5	MW-09			Max.	2.5
0.5	MW-10				
0.5	MW-12				
2.5	MW-13				
0.5	MW-14	Lognormal distribution?		Normal distribution?	
0.5	MW-15	r-squared is:		r-squared is:	
0.28	MW-16	Recommendations:			
0.5	MW-17	Reject lognormal distribution. W value is 0.6899. This is less than the tabled value of 0.874 Reject normal distribution. W value is 0.5272. This is less than the tabled value of 0.874			
UCL (based on t-statistic) is 1.11167560039813					

Table B-4.2
Distribution Analysis and Statistical Summaries - Groundwater (Outdoor Air)
Benzene

Concentration (ug/L)	Well	MTCASstat 2.1			
12.5	HO-2				
1.25	MW-01	Number of samples		Uncensored values	
0.5	MW-04	Uncensored	38	Mean	30.63
0.25	MW-04	Censored		Lognormal mean	38.61
0.5	MW-05	Detection limit or PQL		Std. devn.	83.94082336
0.5	MW-05	Method detection limit		Median	0.5
0.25	MW-05	TOTAL	38	Min.	0.25
32.5	MW-06			Max.	420
37.1	MW-06				
0.5	MW-07				
0.5	MW-07				
0.25	MW-07	Lognormal distribution?		Normal distribution?	
9.66	MW-08	r-squared is:		r-squared is:	
10.8	MW-08	Recommendations:			
2.85	MW-08	Reject lognormal distribution.			
420	MW-09	W value is 0.8333. This is less than the tabled value of 0.938			
312	MW-09	Reject normal distribution.			
15.5	MW-10	W value is 0.409. This is less than the tabled value of 0.938			
16.7	MW-10				
0.5	MW-12				
0.5	MW-12				
109	MW-13	UCL (based on t-statistic) is 53.6159758250292			
48.5	MW-13				
0.5	MW-14				
0.25	MW-14				
0.5	MW-15				
0.25	MW-15				
49.1	MW-16				
46	MW-16				
0.5	MW-17				
0.25	MW-17				
0.25	MW-18				
12.9	RF-4				
1.25	SP-10				
0.25	SP-11				
0.25	SP-13				
18.9	SP-2				
0.25	SS-21				

Table B-4.3
Distribution Analysis and Statistical Summaries - Groundwater (Outdoor Air)
Naphthalene

Concentration (ug/L)	Well Location	MTCAStat 2.1			
2340	HO-2				
31.5	MW-01	Number of samples		Uncensored values	
2.5	MW-04	Uncensored	40	Mean	65.17
1	MW-04	Censored		Lognormal mean	12.02
0.5	MW-05	Detection limit or PQL		Std. devn.	369.2485343
2.5	MW-05	Method detection limit		Median	2.5
0.0968	MW-05	TOTAL	40	Min.	0.0968
1.76	MW-06			Max.	2340
1	MW-06				
0.5	MW-07				
2.5	MW-07				
1	MW-07	Lognormal distribution?		Normal distribution?	
50.9	MW-08	r-squared is:		r-squared is:	
4.23	MW-08	Recommendations:			
4.92	MW-08	Reject lognormal distribution.			
8.36	MW-08	W value is 0.8774. This is less than the tabled value of 0.94			
2.65	MW-09	Reject normal distribution.			
5	MW-09	W value is 0.1795. This is less than the tabled value of 0.94			
7.76	MW-10				
2	MW-10				
2.5	MW-12				
2	MW-12	UCL (based on t-statistic) is 163.563328441697			
5	MW-13				
5	MW-13				
2.5	MW-14				
1	MW-14				
2.5	MW-15				
1	MW-15				
7.26	MW-16				
5	MW-16				
0.28	MW-17				
1.06	MW-17				
1	MW-18				
87.6	RF-4				
8.42	SP-10				
1	SP-11				
1	SP-13				
0.5	SP-2				
0.5	SP-3				
1	SS-21				

Table B-4.4
Distribution Analysis and Statistical Summaries - Groundwater (Outdoor Air)
n-Propylbenzene

Concentration (ug/L)	Well Location	MTCAStat 2.1			
11.3	MW-01				
0.21	MW-04	Number of samples		Uncensored values	
0.5	MW-05	Uncensored	17	Mean	30.94
0.5	MW-05	Censored		Lognormal mean	39.15
5.43	MW-06	Detection limit or PQL		Std. devn.	75.30579684
0.5	MW-07	Method detection limit		Median	2.92
0.5	MW-07	TOTAL	17	Min.	0.21
2.39	MW-08			Max.	308
47.5	MW-08				
3.05	MW-09				
71.1	MW-10				
3.12	MW-12	Lognormal distribution?		Normal distribution?	
308	MW-13	r-squared is:		r-squared is:	
2.92	MW-14	Recommendations:			
0.5	MW-15	Assume lognormal distribution.			
68.1	MW-16	W value is 0.9. This exceeds the tabled value of 0.892			
0.29	MW-17				
UCL (based on t-statistic) is 62.8254173849386					

PART B-5
GROUNDWATER (INDOOR AIR)

Table B-5.1
Distribution Analysis and Statistical Summaries - Groundwater (Indoor Air)
1,2-Dichloroethane

Concentration (ug/L)	Well Location	MTCAStat 2.1							
0.61	MW-06	Number of samples		Uncensored values					
0.5	MW-14	Uncensored	3	Mean	0.54				
0.5	MW-17	Censored		Lognormal mean	0.54				
		Detection limit or PQL		Std. devn.	0.06350853				
		Method detection limit		Median	0.5				
		TOTAL	3	Min.	0.5				
				Max.	0.61				
Lognormal distribution?		Normal distribution?							
r-squared is:		r-squared is:							
Recommendations:									
Reject lognormal distribution.									
W value is 0.7511. This is less than the tabled value of 0.767									
Reject normal distribution.									
W value is 0.7438. This is less than the tabled value of 0.767									
UCL (based on t-statistic) is 0.64373333333335									

Table B-5.2
Distribution Analysis and Statistical Summaries - Groundwater (Indoor Air)
Benzene

Concentration (ug/L)	Well Location	MTCAStat 2.1							
12.5	HO-2	Number of samples		Uncensored values					
32.5	MW-06	Uncensored	7	Mean	11.94				
37.1	MW-06	Censored		Lognormal mean	31.67				
0.5	MW-14	Detection limit or PQL		Std. devn.	16.2845128				
0.25	MW-14	Method detection limit		Median	0.5				
0.5	MW-17	TOTAL	7	Min.	0.25				
0.25	MW-17			Max.	37.1				
Lognormal distribution?		Normal distribution?							
r-squared is:		r-squared is:							
Recommendations:									
Reject lognormal distribution.									
W value is 0.7922. This is less than the tabled value of 0.803									
Reject normal distribution.									
W value is 0.7448. This is less than the tabled value of 0.803									
UCL (based on t-statistic) is 23.9019586043754									

Table B-5.3
Distribution Analysis and Statistical Summaries - Groundwater (Indoor Air)
Naphthalene

Concentration (ug/L)	Well Location	MTCAStat 2.1							
2340	HO-2	Number of samples		Uncensored values					
1.76	MW-06	Uncensored	8	Mean	293.51				
1	MW-06	Censored		Lognormal mean	143.82				
2.5	MW-14	Detection limit or PQL		Std. devn.	826.9061182				
1	MW-14	Method detection limit		Median	1.03				
0.28	MW-17	TOTAL	8	Min.	0.28				
1.06	MW-17			Max.	2340				
0.5	SP-3								
Lognormal distribution?		Normal distribution?							
r-squared is:		r-squared is:							
Recommendations:									
Reject lognormal distribution.									
W value is 0.6509. This is less than the tabled value of 0.818									
Reject normal distribution.									
W value is 0.4194. This is less than the tabled value of 0.818									
UCL (based on t-statistic) is 847.526100103458									

Table B-5.4
Distribution Analysis and Statistical Summaries - Groundwater (Indoor Air)
n-Propylbenzene

Concentration (ug/L)	Well Location	MTCASStat 2.1							
5.43	MW-06	Number of samples		Uncensored values					
2.92	MW-14	Uncensored	3	Mean	2.88				
0.29	MW-17	Censored		Lognormal mean	5.48				
		Detection limit or PQL		Std. devn.	2.570233452				
		Method detection limit		Median	2.92				
		TOTAL	3	Min.	0.29				
				Max.	5.43				
Lognormal distribution? r-squared is:		Normal distribution? r-squared is:							
Recommendations: Assume lognormal distribution. W value is 0.9002. This exceeds the tabled value of 0.767									
UCL (based on t-statistic) is 7.21									

PART B-6
90UCL CALCULATIONS

TABLE B-6.1: 90UCL CALCULATIONS FOR SURFACE SOIL

Chemical	Mean¹ (mg/kg)	StdDev¹ (mg/kg)	N of cases¹	90UCL² (mg/kg)
Benzene	0.067	0.033	500	0.06888903
Naphthalene	0.451	0.148	500	0.459472014
Benzo(a)anthracene	2.052	0.789	500	2.097164995
Benzo(a)pyrene	2.063	0.789	500	2.108164995
Benzo(b)fluoranthene	2.197	0.904	500	2.24874798
Dibenz(a,h)anthracene	0.733	0.263	500	0.748054998
Indeno(1,2,3-cd)pyrene	1.639	0.602	500	1.673460491
Arsenic	6.327	1.652	500	6.421565998
Chromium	251.905	82.955	500	256.6536213

¹These are the bootstrap estimates from the Systat outputs below.

²The 90th percent upper confidence limit (90UCL) is calculated using the t-statistic of 1.28 for $\alpha = 0.10$ for a one-tailed test.

SYSTATv.9 OUTPUT

Benzene		Dibenz(a,h)anthracene	
N of cases	500	N of cases	500
Minimum	0.023	Minimum	0.139
Maximum	0.185	Maximum	1.469
Mean	0.067	Mean	0.733
Standard Dev	0.033	Standard Dev	0.263
Naphthalene		Indeno(1,2,3-cd)pyrene	
N of cases	500	N of cases	500
Minimum	0.081	Minimum	0.261
Maximum	0.986	Maximum	3.869
Mean	0.451	Mean	1.639
Standard Dev	0.148	Standard Dev	0.602
Benzo(a)anthracene		Arsenic	
N of cases	500	N of cases	500
Minimum	0.322	Minimum	3.689
Maximum	4.561	Maximum	12.774
Mean	2.052	Mean	6.327
Standard Dev	0.789	Standard Dev	1.652
Benzo(a)pyrene		Chromium	
N of cases	500	N of cases	500
Minimum	0.477	Minimum	74.14
Maximum	5.525	Maximum	559.237
Mean	2.063	Mean	251.905
Standard Dev	0.789	Standard Dev	82.955
Benzo(b)fluoranthene			
N of cases	500		
Minimum	0.349		
Maximum	5.618		
Mean	2.197		
Standard Dev	0.904		

TABLE B-6.2: 90UCL CALCULATIONS FOR SURFACE AND SUBSURFACE SOIL

Chemical	Mean ¹ (mg/kg)	StdDev ¹ (mg/kg)	N of cases ¹	90UCL ² (mg/kg)
Benzene	0.421	0.289	500	0.437543325
Naphthalene	2.664	1.735	500	2.763317195
n-Propylbenzene	4.813	1.572	500	4.902986531
Benzo(a)anthracene	1.033	0.38	500	1.054752469
Benzo(a)pyrene	1.037	0.37	500	1.058180036
Benzo(b)fluoranthene	1.094	0.401	500	1.116954579
Dibenz(a,h)anthracene	0.39	0.119	500	0.396811957
Indeno(1,2,3-cd)pyrene	0.814	0.293	500	0.830772299
Arsenic	7.062	1.542	500	7.150269231
Chromium	228.864	78.927	500	233.3820451

¹These are the bootstrap estimates from the Systat outputs below.

²The 90th percent upper confidence limit (90UCL) is calculated using the t-statistic of 1.28 for $\alpha = 0.10$ for a one-tailed test.

SYSTATv.9 OUTPUT

Benzene		Benzo(b)fluoranthene	
N of cases	500	N of cases	500
Minimum	0.055	Minimum	0.236
Maximum	1.618	Maximum	2.198
Mean	0.421	Mean	1.094
Standard Dev	0.289	Standard Dev	0.401
Naphthalene		Dibenz(a,h)anthracene	
N of cases	500	N of cases	500
Minimum	0.37	Minimum	0.06
Maximum	9.784	Maximum	0.803
Mean	2.664	Mean	0.39
Standard Dev	1.735	Standard Dev	0.119
n-Propylbenzene		Indeno(1,2,3-cd)pyrene	
N of cases	500	N of cases	500
Minimum	0.122	Minimum	0.158
Maximum	10.213	Maximum	2.072
Mean	4.813	Mean	0.814
Standard Dev	1.572	Standard Dev	0.293
Benzo(a)anthracene		Arsenic	
N of cases	500	N of cases	500
Minimum	0.206	Minimum	4.301
Maximum	2.579	Maximum	15.077
Mean	1.033	Mean	7.062
Standard Dev	0.38	Standard Dev	1.542
Benzo(a)pyrene		Chromium	
N of cases	500	N of cases	500
Minimum	0.288	Minimum	69.051
Maximum	2.38	Maximum	509.89
Mean	1.037	Mean	228.864
Standard Dev	0.37	Standard Dev	78.927

Table B-6.3: 90UCL CALCULATIONS FOR SURFACE/SUBSURFACE SOIL (INDOOR AIR)

Chemical	Mean ¹ (mg/kg)	StdDev ¹ (mg/kg)	N of cases ¹	90UCL ² (mg/kg)
Benzene	0.297	0.223	500	0.309765265
Naphthalene	17.49	14.888	500	18.34223885

¹These are the bootstrap estimates from the Systat outputs below.

²The 90th percent upper confidence limit (90UCL) is calculated using the t-statistic of 1.28 for $\alpha = 0.10$ for a one-tailed test.

SYSTATv.9 OUTPUT

Naphthalene	
N of cases	500
Minimum	0.025
Maximum	67.745
Mean	17.49
Standard Dev	14.888
Benzene	
N of cases	500
Minimum	0.018
Maximum	1.042
Mean	0.297
Standard Dev	0.223

TABLE B-6.4: 90UCL CALCULATIONS FOR GROUNDWATER (Ambient Air)

Chemical	Mean ¹ (ug/L)	StdDev ¹ (ug/L)	N of cases ¹	90UCL ² (ug/L)
1,2-Dichloroethane	0.748	0.186	500	0.75864726
Benzene	30.583	13.392	500	31.3496028
Naphthalene	65.324	54.818	500	68.4619654
n-Propylbenzene	30.81	17.235	500	31.796589

¹These are the bootstrap estimates from the Systat outputs below.

²The 90th percent upper confidence limit (90UCL) is calculated using the t-statistic of 1.28 for $\alpha = 0.10$ for a one-tailed test.

SYSTATv.9 OUTPUT

1,2-Dichloroethane	
N of cases	500
Minimum	0.433
Maximum	1.419
Mean	0.748
Standard Dev	0.186
Benzene	
N of cases	500
Minimum	6.747
Maximum	83.635
Mean	30.583
Standard Dev	13.392
Naphthalene	
N of cases	500
Minimum	2.104
Maximum	292.602
Mean	65.324
Standard Dev	54.818
n-Propylbenzene	
N of cases	500
Minimum	1.097
Maximum	91.264
Mean	30.81
Standard Dev	17.235

Appendix C
Johnson And Ettinger Model Printouts (Data Entry And Calculation Sheets)

Appendix C
Johnson And Ettinger Model Printouts
(Data Entry And Calculation Sheets)

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PART C-1
GROUNDWATER VAPORS (INDOOR AIR)

Table C-1.1
Johnson and Ettinger Model Data Entry Printout for Benzene in Groundwater

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

GW-ADV
Version 2.3; 03/01

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES

ENTER Chemical
CAS No.
(numbers only,
no dashes)

Initial
groundwater
conc.,
CW
(ug/L)

71432 3.71E+01

Infinite
source
bldg.
conc.,
Building
(ug/m³)

3.39E-02

Chemical
Benzene

MORE <input type="button" value="▼"/>	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
	Average soil/ groundwater temperature, TS (oC)	below grade to bottom of enclosed space floor, LF (cm)	Depth below grade to water table, LWT (cm)	Thickness of soil stratum A, hA (cm)	Thickness of soil stratum B, hB (cm)	Thickness of soil stratum C, hC (cm)	Soil stratum directly above water table, (Enter A, B, or C)	SCS soil type directly above water table
10	15	488	213.4	274.3	0	b	sl	s

MORE <input type="button" value="▼"/>	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
	Stratum A soil dry bulk density, pBA (g/cm ³)	Stratum A soil total porosity, nA (unitless)	Stratum A soil water-filled porosity, thetaA (cm ³ /cm ³)	Stratum B soil dry bulk density, pBB (g/cm ³)	Stratum B soil total porosity, nB (unitless)	Stratum B soil water-filled porosity, thetaB (cm ³ /cm ³)	Stratum C soil dry bulk density, pBC (g/cm ³)	Stratum C soil total porosity, nC (unitless)
1.66	0.375	0.054	1.35	0.489	0.167	0	0	0

MORE <input type="button" value="▼"/>	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
	Enclosed space floor thickness, Lcrack (cm)	Soil-bldg. pressure differential, ATI (g/cm-s ²)	Enclosed space floor length, LB (cm)	Enclosed space floor width, WB (cm)	Enclosed space height, HB (cm)	Floor-wall seam crack width, w (cm)
15	40	3048	1341	305	0.1	2

MORE <input type="button" value="▼"/>	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
	Averaging time for carcinogens, noncarcinogens, ATC (yrs)	Averaging time for carcinogens, noncarcinogens, ATNC (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1	

Used to calculate risk-based
groundwater concentration.

END

Table C-1.2
Johnson and Ettinger Model Data Entry Printout for 1,2-Dichloroethane in Groundwater

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" In "YES" box)

GW-ADV
Version 2.3; 03/01

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" In "YES" box and initial groundwater conc. below)

YES

X

ENTER Initial
Chemical groundwater
CAS No. conc.
(numbers only,
no dashes) CW
(ug/L)

Infinite source bldg. conc. Cbuilding (ug/m ³)
1.37E-04

107062 6.10E-01

Chemical

1,2-Dichloroethane

ENTER ENTER ENTER
Average Depth Depth
soil/groundwater below grade to bottom of enclosed space floor, LWT
temperature, TS (OC) (cm) (cm)

ENTER ENTER ENTER
Totals must add up to value of LWT (cell D28)
Thickness Thickness
Thickness of soil stratum B, stratum C,
stratum A, (Enter value or 0) (Enter value or 0)
hA (cm) hB (cm) hC (cm)

ENTER ENTER
Soil stratum directly above water table,
stratum A, SCS soil type
(Enter A, B, or C) (Enter A, B, or C)

ENTER ENTER
Soil stratum A SCS soil type
stratum A (used to estimate OR
soil vapor permeability) permeability,
kv (cm²)

MORE ↓ ENTER Stratum A Stratum A Stratum A
Stratum A soil dry soil total soil water-filled
bulk density, nA porosity, θwA
ρBA (g/cm³) (unitless) (cm³/cm³)

ENTER Stratum B Stratum B Stratum B
Stratum B soil dry soil total soil water-filled
bulk density, nB porosity, θwB
ρBB (g/cm³) (unitless) (cm³/cm³)

ENTER Stratum C Stratum C Stratum C
Stratum C soil dry soil total soil water-filled
bulk density, nC porosity, θwX
ρBX (g/cm³) (unitless) (cm³/cm³)

1.66 0.375 0.054 1.35 0.489 0.167 0 0 0
MORE ↓ ENTER Enclosed Enclosed Enclosed
Enclosed space space space
space floor floor floor
thickness, differential, length, width,
Lcrack ΔT LB WB
(cm) (g/cm·s²) (cm) (cm)

ENTER Enclosed Enclosed Floor-wall
Enclosed space space seam crack width,
space floor height, w
width, HB (cm) (cm) (cm)
Floor-wall seam crack width, w
width, HB (cm) (cm) (cm)
Indoor air exchange rate, ER
(1/h)

15 40 3048 1341 305 0.1 2
MORE ↓ ENTER Averaging Averaging ENTER ENTER
Averaging time for time for Target Target hazard
time for carcinogens, noncarcinogens, ATC Target risk for quotient for
carcinogens, ATNC carcinogens, TR noncarcinogens,
(yrs) (yrs) ED EF (days/yr) (unitless) THQ (unitless)

70 25 25 250 1.0E-06 1
Used to calculate risk-based groundwater concentration.

END

Table C-1.3
Johnson and Ettinger Model Data Entry Printout for Naphthalene in Groundwater

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

GW-ADV
Version 2.3; 03/01

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES

ENTER Chemical Initial groundwater
CAS No. conc.
(numbers only,
no dashes) CW
(ug/L)

Infinite source
bldg.
conc.
Building
(ug/m³)

Chemical

91203 2.34E+03

1.68E-01

Naphthalene

MORE ↓	ENTER Average soil/groundwater temperature, TS (°C)	ENTER Depth below grade to bottom of enclosed space floor, LF (cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER Thickness of soil stratum A, hA (cm)	ENTER Thickness of soil stratum B, hB (cm)	ENTER Thickness of soil stratum C, hC (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	ENTER User-defined stratum A soil vapor permeability, kv (cm ²)
	Totals must add up to value of LWT (cell D28)									
	10	15	488	213.4	274.3	0	b	sl	s	

MORE ↓	ENTER Stratum A soil dry bulk density, ρ_{BA} (g/cm ³)	ENTER Stratum A soil total porosity, nA (unitless)	ENTER Stratum A soil water-filled porosity, θ_{wA} (cm ³ /cm ³)	ENTER Stratum B soil dry bulk density, ρ_{BB} (g/cm ³)	ENTER Stratum B soil total porosity, nB (unitless)	ENTER Stratum B soil water-filled porosity, θ_{wB} (cm ³ /cm ³)	ENTER Stratum C soil dry bulk density, ρ_{BC} (g/cm ³)	ENTER Stratum C soil total porosity, nC (unitless)	ENTER Stratum C soil water-filled porosity, θ_{wC} (cm ³ /cm ³)	
	Totals must add up to value of LWT (cell D28)									
	1.66	0.375	0.054	1.35	0.489	0.167	0	0	0	

MORE ↓	ENTER Enclosed space floor thickness, Lcrack (cm)	ENTER Soil-bldg. pressure differential, $\Delta\Gamma$ (g/cm·s ²)	ENTER Enclosed space floor length, LB (cm)	ENTER Enclosed space floor width, WB (cm)	ENTER Enclosed space height, HB (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
	Totals must add up to value of LWT (cell D28)						
	15	40	3048	1341	305	0.1	2

MORE ↓	ENTER Averaging time for carcinogens, ATC (yrs)	ENTER Averaging time for noncarcinogens, ATNC (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
	Totals must add up to value of LWT (cell D28)					
	70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

1 of 1